

Also includes notes FOR SEPT 16-18,  
1943

LIST OF PHOTOGRAPHS TAKEN BY  
FOSHAG, #'s 1-75

LIST OF FISHER'S FILM ??



MEXICO - PARICUTI  
RECORD  
1945

U. S. GOVERNMENT PRINTING OFFICE  
PROPERTY NO. 50177



$$12 \times 16 = 192$$

Speed of Sound  
1142 ft per sec.

1 sec	=	16 feet
2 "	=	64 "
3 "	=	144 "
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Sept. 16, 1943

Left Uruapan at 10 A.M. Low hanging clouds, obscuring the volcano, which we did not see until we reached the old campsite. The cone was distinctly expanded, much higher to the south. The smoke column was normal. Explosions were steady and the weakest I have seen. Considerable dense smoke with infrequent good bursts of bombs, bombs not large, and in general falling on the upper part of the cone.

Night shows rain to regular. During most of the night the cone hidden by fog and rain.

Sept. 17 Strong wind to west carrying smoke column against west flank of crater. Frequent strong bursts from center of crater with numerous small to medium bombs, shooting up fingers about 500 meters and varying from 3 to 20 seconds apart. Many were compound bursts, that is one, followed immediately by a second, or even third impulses. In late afternoon saw a



Long columns, revolving rapidly,  
and moved to the slope of the  
cone, beginning at the crater  
rim and travelling slowly down  
the slope. The columns extended  
from the slope to the smoke  
cloud.



Length of the columns about 600 m.  
diameter about 10 meters.

Travelling down the slope in about  
1 hour.

Later saw a thick one slowly form  
on the thick dust about the  
summit of the cone, and again  
a thin and very perfect one, like  
a "cable" extending from the dust  
to the smoke fall, revolving rapidly  
and then melt away. The second  
one formed a thin ash column  
below it.

Beneath the arching smoke cloud,  
the air showed much turbulence.  
The dust from the falling bombs  
was carried along the side of the

cone toward the summit, where  
it met the dust cloud and  
downward. Below the dust cloud  
the vapor clouds were pushed  
into the ash cloud in a large  
inverted funnel.

Later the columns joined frequently  
sometimes two at one time. Some  
were thick and rotated languidly,  
others thin and well defined,  
rotating rapidly. Some were  
estimated at a distance in  
length, from the slope of the cone  
to the point where they joined  
the smoke cloud. Some more  
changed their position very  
little, others moved down the  
slope of the cone, across the  
ash field to the base of Parícutin  
hill.

They frequently began as a  
whirlwind in the ash cloud  
near the summit of the cone  
and gradually advanced toward  
the smoke cloud.

Left Parícutin about 5 P.M.  
Night display from road very  
good, with high fingers of  
incandescent ash and the ash



cloud blown against the west  
 rim of the crater



Activity somewhat diminished in  
 the evening.

Sept 18.

Left Huapán about 10 A.M.  
 from the rock, wavy smoke column  
 but not high and with little  
 smoke plume. Apparently activity  
 much decreased.

The Azul river is located on the  
 nose of a small ridge extending  
 from the west side of a small  
 basin in limestone. Entering this  
 basin from the northwest is the  
 deep Huayula arroyo, whose head  
 waters are in the high main  
 mass of the Huasteca, with steep  
 walls of rhyolite flows and  
 limestone conglomerates. The  
 smaller Chacalacas arroyo enters  
 the basin from the north, also  
 cutting conglomerates and rhyolite.  
 The Huayula arroyo leaves the  
 Azul basin (Huayula Hija) by  
 means of a small narrow  
 valley in limestone.

The east slopes of the Hija de  
 Huayula are made up  
 entirely of medium bedded limestone  
 with a general strike of NW-SW  
 and dip of N.E. Except for the  
 relatively steep slopes along the  
 arroyo de Huayula, the upland  
 surface is rolling and represents  
 a moderately old topography with  
 scattered small sink hole basins.

The northern and eastern slopes  
 are somewhat more irregular



"Zopilote"

with more rounded topography, low smooth ridges and short shallow arroyos but with scattered huge boulder masses of volcanic tuff or rhyolite. These smooth lower slopes consist of softer limestone conglomerates the overly unconformably the limestone-shale series. The higher rim of the basin are rugged wooded cliffs of rhyolite cut by deep canyons representing thick, old defined flows dipping gently to the N.E.

The southern limit of the basin is a limestone ridge cut by the Arroyo de Huajuquilla.

The basin appears to owe its origin to headwater erosion uncovering, in part, an old ~~or~~ but hole basin at the pre-conglomerate surface, or perhaps an old head water basin of a pre conglomerate drainage system the was at one time connected with the present Amacuzac system. The bottom of the Hoya de Huajuquilla is now made up

of scattered areas of basement limestone and of partly removed limestone conglomerate. In the Cerro de la Cruz, near Acuitlapan, the tuff rest directly upon the old limestone surface. If there ever were limestone conglomerates on the old surface between the Azul mine and this hill, there is now no evidence remaining of their possible former presence.

Don't they also thin out to the N.E. beyond Xochitlan?

Doesn't it, with the Acuitlapan lgs represent the S.W. edge of a basin extending to the N.W. under Coahuila the Huasteca? Don't they probably originate in the high Sierra south of Julianita.

Does the original basin lie between the Sierra de Julianita and the Sierra de Xochitlan?

149

shale, immediately followed by  
tuff

Small bench of lat

tuff

phyolite - fault

Cg. flat

150

Cg. minor fault.

Chetobasos.

Cg. faulted (?)

So.

Huapuyula arroyo.

al.

Huapuyula sign. al. a fault

Arroyo al or fault

Cg.

Arroyo

Cg.

Azul rid

minor fault.

White rock.

Arroyo.

Cg.

152

lat shale.

Cg.

Fault

Scop

Cg

Phy

small

Cg.

T



Jan. 16, 1945.

Photo 10 from new station  
5:15 P.M. with small white  
steam column. Dusty

E.C. During morning large gray  
eruptive column with frequent  
bursts, gradually becoming  
paler and weaker until  
4 P.M. when eruptive column  
was very pale gray with almost  
pure steam

E.C. At 5 P.M. weak cloud very pale  
gray in color with deep vibrant  
roars, without cauliflower and  
lazy column, apparently only  
steam activity in the throat

During the night numerous tremors.  
Perhaps the new cabin is built so  
tremors as to be more effected. Seems like  
many tremors and sound of explosion  
almost coincident. also one  
subterranean "quake"



Jan. 17, 1945

E.C. 8:00 AM. Heavy gritty cloud, light gray in color rising languidly

E.C. 8:30 Heavy roars yielding a rather wide but tenuous column that does not rise very high but drifts slowly to the east. color pale grayish brown, occasional weak cauliflowerers of same color. Ash cloud to the east apparently from 7:00 AM. column.

E.C. at 12 PM. column changed to less erratic gray column with few cauliflowerers and not much noise.

Slide At about 11:30 a slide of ash occurred on the N.W. slope of the cone extending from 20 meters above the base to almost the rim, flattening the cone slightly on this slope. No indications of any lava break thru at this point.

While resting on top of August ridge noticed that the ground was tremulous, the strongest shakes coming at irregular intervals. Could not correlate these shakes with any activity in the crater. Took several places and found them

much weaker on the east slope of the ridge.

E.C. During the night the eruptive column diminished, until hardly any column was apparent but activity increased, the noise being heavy rolling thunder that shook the cabin, meanwhile bomb bursts in fairly quick succession sending up blunt cones, with the highest bombs up to 8 seconds. Very few bombs fell on the north slope. Shaking of the ground was very much weaker this night than last.

Partly cloudy. dusty. cold at night

Jan. 18

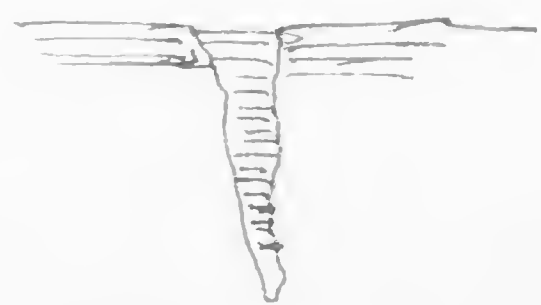
E.C.

8.00. Full pale gray cloud rising lazily with occasional languid cauliflower: cloud with gutty appearance. Noise intermittent low rumbling growls to low rumblings. Column rising vertically and lazily for lack of wind.

1:30 Heavy light gray cauliflowers with sound of heavy surf.

In front of the campamento de abroa, a ridge has been raised in the old lava flow 35 m. high, with the ash beds dipping steeply quaquaversally, except for some horizontal remnants on top. At the tremor zone, tremors are still perceptible, altho in the arroyo immediately south, washed into the ash none were felt.

The San Juan flow S.W. and S. of the cone is newly crevassed. These crevasses, sometimes 2 meters wide and 5 or more meters deep are filling with ash and will form ash dikes



Many times, when there is no confusion from repeated shocks, a good short is followed by the noise of the explosion of 4 seconds. (aged of sound). When there are no tremors there are no explosions.

None of the  
tremors

Aguam  
Flow

The Aguam flow, at its source, is now frozen over and is a jumble of broken blocks, variously colored brown, yellow and orange. Some slumping and collapse has taken place here. There are patches of iron chlorides and a few low hornitos, none now very active. The large hornito at the head of the flow is covered with bombs from the crater.

Arcs.

2:00 P.M. heavy explosions apparently from the south crater with good cauliflower heads of light gray color, noise like heavy cannonading and flashing arcs. One large destined explosion will produce a single well define arc. a heavy intermittent rumbling a series of successive arcs in rapid succession.

Section

In the new arroyo at the Campamento de abroa, the ash is dissected to a depth of about 8 meters and shows several layers of pebbles and cobbles from the Caniguato basalt.

Placed tubes in fumaroles A1 and A2. after 6 hrs collected a liter



of condensates from A2. but A1.

~~condensates~~ was working very poorly. In A2 condensation in the lead tube and in the gas tube took place rapidly.

EC At about 6 P.M. activity in the crater began to decrease and during the night many good bomb bursts with reduced eruptive column.

Shocks. Many earth shocks during the night.

Clear all day but dusty

Jan. 19.

8.00 A.M. Thin white vapor column but with heavy swarms.

EC 11 A.M. Same but with somewhat increased column

12 A.M. Full cauliflowerers lasting all during afternoon.

Placed tube in hot fumarole A3 on pressure ridge on 2d. Paricutin flow. This is a narrow ridge about 5 meters high along the crest of which ~~are~~ is a line of hot vents issuing from beneath the surface rubble. The largest one is brilliantly colored orange and yellow.

EC In the evening eruptive column decreased and became intermittent altho the noise increased.

Shocks. Strong microseisms during the night.



Jan. 20.

~~at~~ 8.00 A.M. little eruptive column of white steam but strong roars.

The eruptive column gradually increased until at 10 A.M. good column, pale gray, almost white. 2: P.M. strong column activity with great billowing cauliflower and heavy noise with ejection of large viscous masses. Some flashing arcs.

Continued in this manner until evening.

Went to the Aquan flow. The flowing lava issues from a low domed tunnel. At its throat it is about 3 meters wide and the lava flows at a rate of about 45 m. per hr. The surface is firm and is pulled like taffy. Tied a tube in a small almost extinct hornito but there was not enough vapors to condense in the tube.

During the night few microweak

Jan. 21

Morning: Large dark gray lazy eruptive column and much fine ash falling, particularly to the north. Low rumbles in the crater. 12. A.M. increased column with cauliflower and little or no noise, remaining so all afternoon.

6 P.M. reduction in smoke column to thin vapory column with greatly increased noise. 9 P.M. intermittent thin column and heavy noise.

Strong microweaks during the night.

Collected minerals during the day at the fumaroles on the August flow. Found that crevices in the ash with slight greenish stains on both sides indicated good salts below. The iron chlorides are confined to a narrow zone of a few inches. Below the iron salts are burned to an iron oxide, above is only damp ash.

Jan. 22.

Morning - weak gully column of gray color and heavy surf sound, much fine ash in the air. Column rises very slowly with very few weak cauliflowerers.

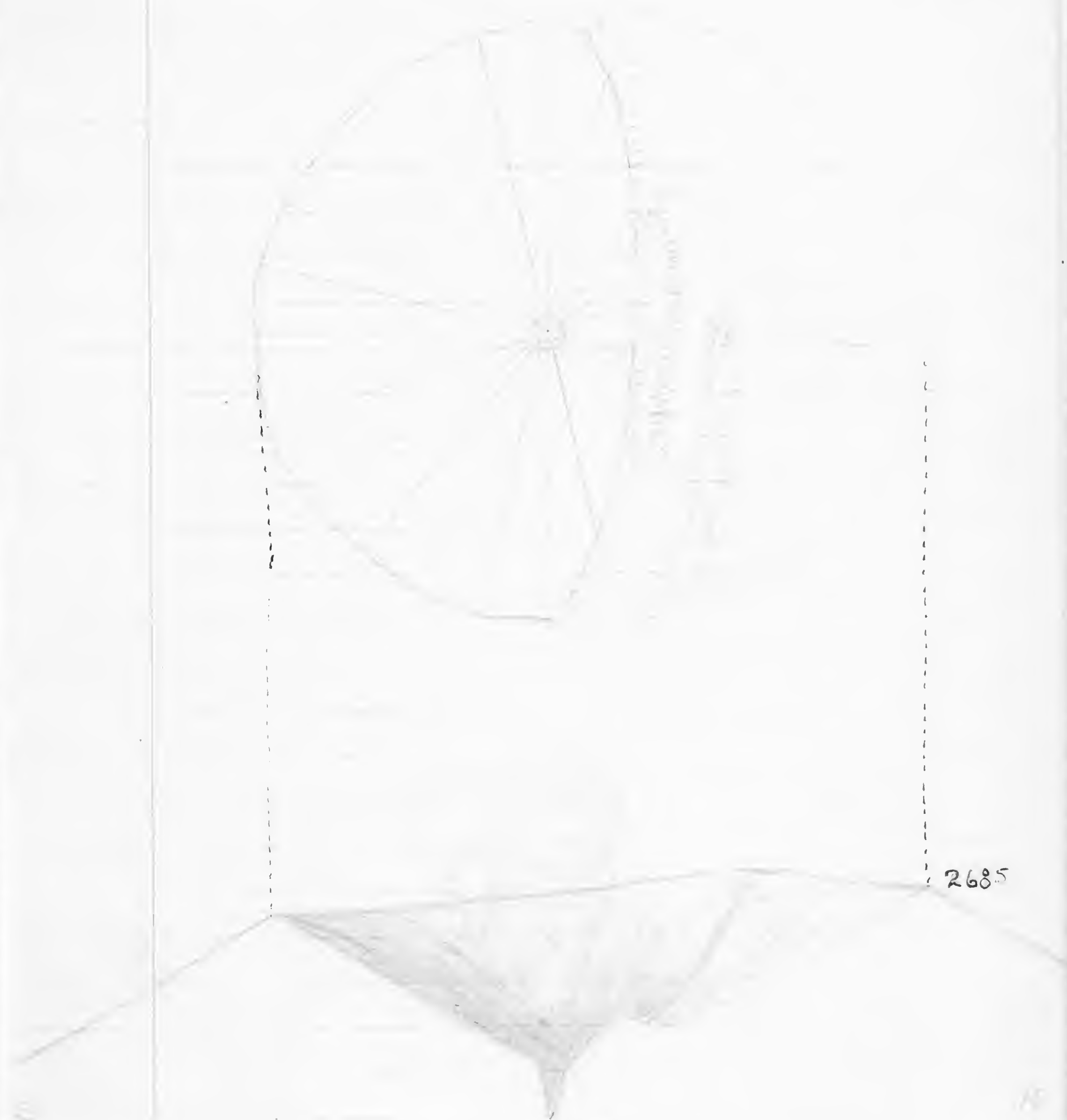
During mid day and early afternoon heavier cloud with cauliflowerers.

Left camp at 4:30 P.M. on way to crater. Eruptive column medium dense at summit 5:55 P.M.

The throat was in active eruption, throwing out numerous bombs up to 9 sec. (1300 feet). The crater showed but one throat, the south vent, the second vent having disappeared or perhaps joined with the south vent, having previously been separated only by a thin septum.

The bench now seems lower and wider than on Nov. 26, the Nov. bench perhaps corresponding to the upper rim ridge. The southern half of the crater is sunken chaped, with angle of repose, leading to what seems a steep walled explosive pipe. Bombs ~~rolling down~~ landing on this slope rolled back into the throat.

The west half of the crater consisted



2685

Jan - 22, 1945



of a curved terrace and somewhat higher a low narrow ridge extending across the terrace half way. The lower part of the terrace was well littered with bombs, the upper half pocked with bomb craters.

The vent is estimated to be 10 meters below the lip of the trench and appeared to have a diameter of about 3 meters, altho it could not quite be seen because of its position at the foot of the terrace. Explosions took place in the vent with great violence, imparting a strong rocking motion to the crater rim, with about 10 explosions per minute. The interval and the strength of the explosions were erratic. Maximum size bombs reached about 1 meter across and were frequently irregularly flat shaped. These larger bombs seldom reached 150 feet high. The bomb bursts were frequently directed slightly to the west, where the slope was corrugated toward the throat with rolls a few feet high. Sometimes

However the bursts were directed slightly to the south east where the crater wall was even.

The cauliflower heads began a few meters above the throat, first expanding rapidly but soon blowing up. Frequently the eruptive column drifted slowly around the crater walls with a spiral motion, even to the extent of filling the whole crater. When such a cloud passed over our position one could detect a distinct odor of  $H_2S$  but not of  $HCl$ , and a fluffy semi-pumiceous ash fell as irregular fragments some to the size of a fist.

The bombs appear to be all semi molten and wobbled in their downward course.

After dark the effect was awesome and undecidable. The incandescent bombs left the crater with great speed, forming a fan shaped plume of fire. The larger bombs could easily be discerned, but the smaller ones were streaks of light to the eye. These smaller ones were



invisible during daylight

Both in daylight and after dark compression waves in the eruptive column frequently followed the bursts. With a rumbling roar this was followed one another in quick succession. In spite of the tremendous explosions the noise at the crater rim could not compare with that of Nov. 26. One could easily be heard talking in a normal tone of voice.

Jan. 23.

F.C.

During the morning a small eruptive column rose from the west rim driven there by a strong east wind.

Left the camp about 10:30 P.M. to climb the cone accompanied by Mr. Tremblay. Activity in the crater like last night, perhaps somewhat stronger.

One

The upper part of the cone is dotted a canary yellow from efflorescence of iron chloride and the bombs embedded in the ash are sometimes encrusted with it. The surface of the cone is now fine ash, dry on the surface up to about  $\frac{1}{2}$ , then moist. The surface is not hot, but slightly steamy warm.

F.C.

At about 12:30 the wind changed to the W and the crater became filled with cloud. Remained so during the rest of the afternoon. Toward evening the column diminished until only weak steam arose and during the night nothing discernible arose from the crater except bombs but the vapors condensed as

EC a great white cloud high above the crater. The explosive noises greatly increased during this phase. This phase undoubtedly represented steam jets from a cleared outflow. Bomb activity was normal, with fine normal bursts against the blue moonlit sky.

Jan. 24.

EC Fine column rising straight up on one fine column, with low rumbling noise, increasing in size during the afternoon to full column with good cauliflower. This was the best eruptive column during the present period, continuing well into the night. Returned to San Juan.

Jan. 25.

Moderate eruptive column.

EC During the period Jan. 16-25 the eruptive column was generally weak in the early morning, increasing during late morning, decreasing again about 4 or 5 P.M. During the weak column the noise was a grating roar, indicating steam jets. The midday activity was medium to strong cauliflower bursts varying from low to deep surging sound, followed in late afternoon and evening but steam jets again.

EC The Aquean flow was moving in two tongues, one toward the west, the other more active



one toward Panzingo and the mesa to the east.

The third Parícutin flow, beginning between the cone and an uplifted ridge that ran to the Campamento de Abasco flowed slowly, filling covering the last flow (Nov. 8) of the 2d. Parícutin flow, filling the hoya at the n.w. base of the cone and sending a long narrow tongue on the 2d. Parícutin flow toward Parícutin village.

#### Flows.

Feb. Mar. 1943

May 1943

June, July, Aug 1943.

Sep. Oct. 1943

Zapicho, Oct. Jan. 1943.

San Juan Jan. 8 - 1944 - Nov. 9, 1944

2d. Parícutin flow

Aguan flow.

3d. Parícutin flow.

Observations on the Fumaroles  
Jan. 1945.

Fumarolic activity is greatly reduced. The San Juan, 2d. Parícutin and Aguan flows show very few fumarolic spots. The only areas of fumaroles are on the Zapicho flow east of the camp, the August ridge, southwest of camp, the front of the high flow from the August flow and the peaks of the first Parícutin lava. All are acid and do not yield such sublimates like the early flows. The hornitos of the San Juan flow are all practically extinct and yield few sublimates, these chiefly iron chlorides and some sulfur. Hornitos on the Aguan flow are weak and last only a short time, yielding strong acid fumes. Bluish fumes rise from the incandescent lavas of the Aguan and 3d. Parícutin flows. The lower San Juan flow is cold, without any fumaroles. The 2d. Parícutin flow shows scattered incipient fumaroles, which may develop later.

On some of the older, deeply ash

covered flows are cracks in the ash cover. Where the area about these cracks is slightly stained with iron chlorides, salts are usually encountered by digging to a depth of a foot or more, below which are cemented ash layers.

Rock alteration varies about the fumaroles. About the hottest ones a thin film of rock is altered to reddish color but the interior appears fresh. Where condensation takes place and the rock is wet, the rock may be extensively altered to a brick red color. Condensation appears to be essential for extensive alteration. Dry steam, even tho it contains HCl, does not appear to be very effective.

## Fumarole Samples

A1.

A small fumarole 7 meters above base of Aug. 1943 ridge, alongside a large block of agglomeratic lava, somewhat altered and spotted with canary yellow crusts.

Opening 30 x 15 cm. emitting good steam. Throat crusted with aborescent white crystals.

Odor slightly sulfurous.

Litmus paper - acid.

Taste of condensate faintly saline; separates a little black sulfur.

$T = 116^{\circ} \text{C}.$

Rock alteration: to a red crumbly mass, with crystals of sulfur in the crevices.

Aqueous condensate large,  
acid Condensate moderate.



A2.

On a ridge of the first Paricutin flow, near summit, now largely covered with ash. One of a group, the throats lined with white salts and the wall rock impregnated with yellow and orange iron salts.

Opening 50x20 cm. with fungus like crust of white salts.

Odor very faintly sulfurous.

Taste very sour.

$T = 314^{\circ}\text{C}.$

Aqueous condensate abundant.

Solid condensate "

Rock alteration: slight oxidized skin  
Sublimates in throat white, around throat speckled orange, rock sparse  
canary yellow.

A3.

Top of rubble ridge on 2d Paricutin flow, issuing from underneath bankers, apparently issuing from a crevice underneath. Heat waves and little visible vapors. The rocks in the hotter portions are crusted with flesh colored oxidized dust; in the cooler portions with canary yellow and light orange reaction salts. No deposited primary sublimates.

Odor strongly acid, choking.

Aqueous condensate moderate.

Solid condensate sparse.

Taste strongly acid.

$T = 500^{\circ}\text{C}.$  or more.

Rock alteration: red oxidized skin, apparently unaltered rock beneath.

A 4.

Front of thick flow from Aug 43 ridge, near the Summit. Part of a group in and about ash covered rock faces. This one was completely covered with ash. Made an opening and found a crack in the ash 1-2 inches wide from which gases issued rather strongly.

Ash layers contained much iron chlorides.

Odor faintly sulfurous.

Taste sour astringent.

Aqueous condensates abundant  
solid condensate sparse.

T =  $460^{\circ}\text{C.} \pm$ .

The covering ash is oxidized and impregnated with salts.

Sun. Feb. 25, 1945.

Arrived the night before with excursion of the Mexican Geological Society. Activity then from the crater was stronger than I had seen it for a number of months, with occasional bomb bursts on the north slope.

Inundant lava could be seen on the Parícutin flow but activity from the Hornos area has decreased considerably. One small red spot was seen in the Aguas flow indicating some slight activity.

During the day heavy smoke column and strong activity from the crater, apparently from two throats. Rain of fine ash at the cabin and some mud. At the base of the cone frequent heavy mud falls, the mud of which reacted acid to litmus and showed a content of  $\text{Cl}$ .

Occasional lightning in the eruptive column. Eruptive column billowing, medium gray, with fine cauliflower-like rising to great height.



May 27, 1945. Sunday.

With Carl Fries & Jack Dorr.

E.C. All during the day, pure white steam clouds from the crater mouth loud surging noise, throwing out bombs over the eastern rim of the crater but containing practically no ash. These steam jets were continuous except for very rare and brief pauses. There were 3 single and heavy bursts of dense ash rising swiftly from another vent, during which brief period the steam vent ceased its activity. The ash bursts were quite impressive, a huge, thick column rising to a height of a kilometer in less than a minute, almost filling the crater from rim to rim. E.C. Some bombs and much ash fell on the upper slopes of the cone.

Climbed the cone with Carl, Jack and Celadonio, remaining about three hours and circling the rim of the crater from the N.E. almost to the South. The crater contains two vents

rather of which occupies a position of the vents seen on previous ascents. One vent is close to the slope of the high eastern point, with steep slope from the point directly to the vent. This vent or throat could not be seen from any station that we occupied but was apparently 2 meters in diameter. This vent gave off almost continuously a rushing jet of white steam with a harsh grating roar that penetrated over body. Sparse bombs of brown color and spongy texture (Zapicho type) were thrown out, rising to an average height of 500 (6 sec) to 800 (7 sec.) feet, altho occasionally to 1600 (10 sec) feet. The column was slightly inclined toward the east, so that practically no bombs fell to the N.W.-W or S.W. There were rare pauses, the column almost immediately beginning again. The remarkable feature of this vent was the long continued emission of almost white steam, with little discoloration

by ash and little variation in the rushing out of the steam.

The second vent was much deeper and larger, separated from the first by a narrow septum. It showed no emissions except the three huge cauliflower-like things that it sent up during the day. The crater was regular, sloping down to a well defined conical point.

In the upper part of the septum that separated the two vents, on the side of the larger crater, were 3 incandescent orifices, the largest about  $1\frac{1}{2}$  meters across from which issued strong jets of vapor. These were connected with the steam vent for their activity increased and decreased in consonance with the variation in the main steam vent.

The inner ~~to~~ north slope of the steam vent side of the crater sloped fairly gently to a narrow bench and then fell abruptly to the throat. The bench was slightly elevated.



and from it steam issued sporadically, to be sucked into the throat by the up-rushing column of vapor.

Between the ash vent and the west rim was a bomb-filled depression leading to a low inner rim about 6 meters high. From this inner rim, the crater sloped uniformly to its center. A low bomb-covered ridge runs from the west rim to the septum separating the two vents.

A slight sulfurous odor pervades the crater.

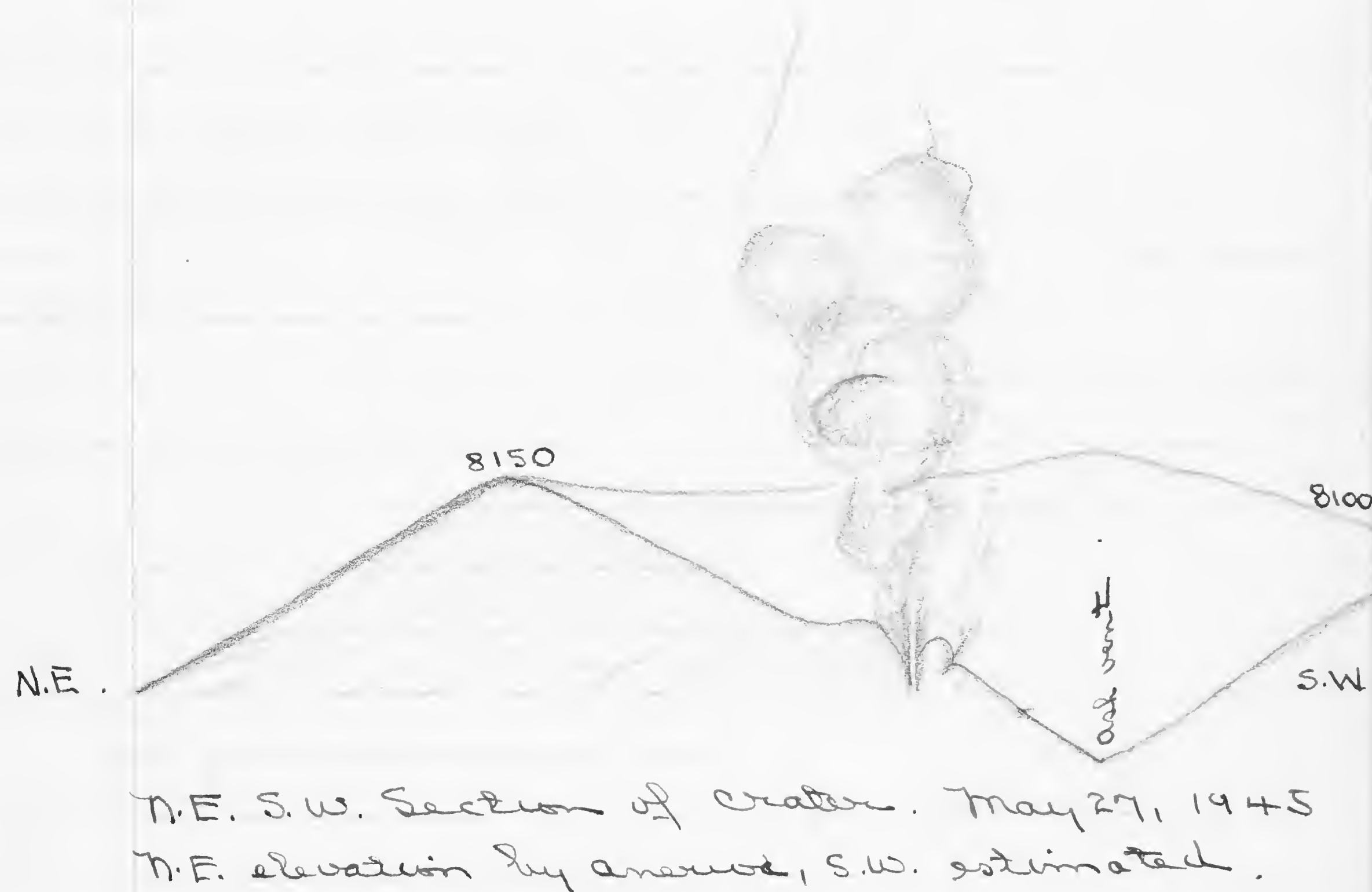
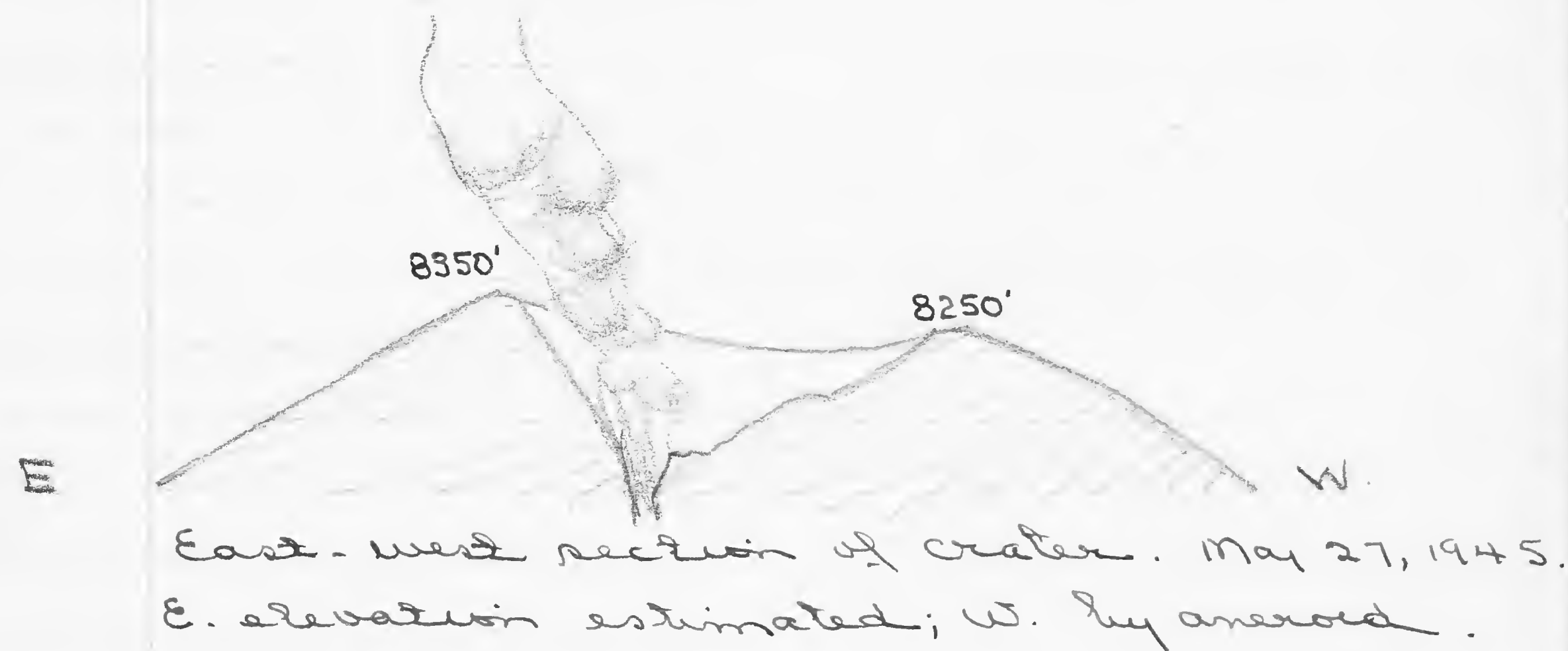
Calculate the amount of water vapor from:

- (1) An orifice of 2 diameters
- (2) Speed, from bombs that take 6-7 seconds to fall.
- (3) Temperature, from fact that vapor is condensed

The vapor column drifted to the west in the morning, to the S. in the afternoon.

Sky clear except for vapor column. Moon full.

Lava flows slowly from the Aguas vent.





May. 28, 1945. Monday

Went with Carl, Jack, Chuchi to the Aguan vent, following the north and north west base of the cone. On the way stopped at the fumaroles on the old Parícutin, June 1943 flow and found them unchanged in appearance. Also excavated a crack in the ash cover to search for minerals. The crack showed a zone of red crystals a few inches below the surface. Below this zone for about 1 foot were scattered small cauliflower-like heads of a white mineral, sometimes tinted pale blue. The steam issuing from the crack was very hot.

oxidized ash.

Red xls.  
white cauliflowers

The old Hornitos area is uplifted and broken by large crevasses, scarps and rugged pinnacles. Two collapsed vulcanitos are still discernible, one about 6 meters high

and 9 meters wide, shows a wide collapsed center filled with sugar lava. Vitreous irregular bombs occur about it. Could detect no tremors in this area.

The Aguan vent has changed its position from the base of the cone to a vulcanito, 10 meters high about 100 meters from the base of the cone and 100 meters south west. The N.E. slope of this vulcanito is steeply conical, made up of blobs of lava. The S.W. side is broken down and shows a number of glowing hornito-like areas from which steam escapes with a loud hissing noise. A throat, about 3 meters across, occupies the west crest of the vulcanito, from which bluish fumes issue lazily. From the cone, to the S.E. for about 300 meters is a low scarp with incandescent crevices emitting copious bluish fumes and gases issuing with a hissing noise. To the west from the vulcanito is a similar scarp. about the base of this



scarp is cold wood lava, followed by an area of pahoehoe lava. This section shows no fumarolic activity.

About 100 m. east of the volcanito ~~open~~ the lava stream issues from a crevassed and sublimated stained low ridge of lava, at its origin about a meter wide but widening rapidly. At its origin it is moving about one meter in 15 seconds. Its surface is a scattering of vesicular, fuzzy lumps separated by very viscous incandescent lava. A rock thrown on the surface makes no impression and rolls, as on a solid mass. Blue, choking fumes are given off by the lava. Occasionally it bulges somewhat but does not heave or yield bursting bubbles.

The fissures in the older lava, yielding bluish fumes deposit a colonial buff sublimates. Sparse white sublimates are also found in the cavities of older lava.

Between the volcanito <sup>(as above)</sup> and the hills to the south, the lava is

deeply crevassed, ~~due to~~ lava movements below. This lava has apparently completely solidified and shows heat in only a few isolated spots, altho not older than Nov. 1944. Individual flows 2-3 meters thick can be seen in these crevasses, separated by about 1 foot of red scoriaceous lava or baked brick red ash. The flows are vesicular throughout and sometimes show some crude shelling in the middle. No tremors were noted in front of the volcanito.

Activity from the crater as of yesterday, with white steam column rising to medium altitude. During the day six huge bursts from the ash vent, three following each other in rapid succession during which the steam vent abated.

Funes and Dore climbed the crater in the evening to witness the vents at night. The small steam vents in the septum gave off small incandescent bombs when the main steam vent was



particularly active.

EC. While they were on the run the ash vent gave one of its bursts. It began with a noise like a small charge of explosive in loose ground and was followed by a rapidly rising but silent heavy column which mushroomed out overhead, raining down non-incandescent bombs and ash. The steam vent was normal up to the time of the ash explosion and there was no change in activity to indicate the coming of the ash explosion, which occurred instantaneously lighting at night in the ash column but not in the steam column.

EC. The activity of the two vents gives one a good clue to the variation in the eruptive column.

Ejecta. The emission from the throat is almost entirely vapors. From the incandescent throat slag may be torn off but the violent rush of steam to yield bombs and ash a light brown

color and very spongy texture. The semi-viscous lining yields semi-bread crust bombs. With continuous heavy steam emission the throat remains clear and a white steam column, with vesicular bombs results. If the steam column scours the wall, as seen on a previous occasion, some ash is carried up from the crater walls, yielding a gray column, varying in density according to the amount of scouring. When there is a slide of crater wall material, a dark column is produced. Such was noted on

If the vent is choked with ash and rubble and when there is constant ploughing of the crater sides the column is rich in ash and bombs and is dark in color. (Temporary columns after the August break is extreme example).

Ejecta. The ash may therefore be classed into two categories:  
(1) primary ash and bombs -



the result of explosions directly from molten lava, or stripping of viscous lava from a throat. yielding in the first case light brown colored bombs with black vesicular interior ~~in~~ (Zapichu); in the second case Zapichu type epicamanta and semi-bread crust bombs.

(2) Secondary ash and bombs, the result of re-worked primary material yielding:

- (1) comminuted ash fragments.
- (2) coke like fragments
- (3) angular fragments from semi-bread crust bombs
- (4) "Boles"; or rounded fragments produced by fragmentation
- (5) spalls, from breaking up of semi-bread crust bombs.
- (6) Agglomerate masses from crater walls.

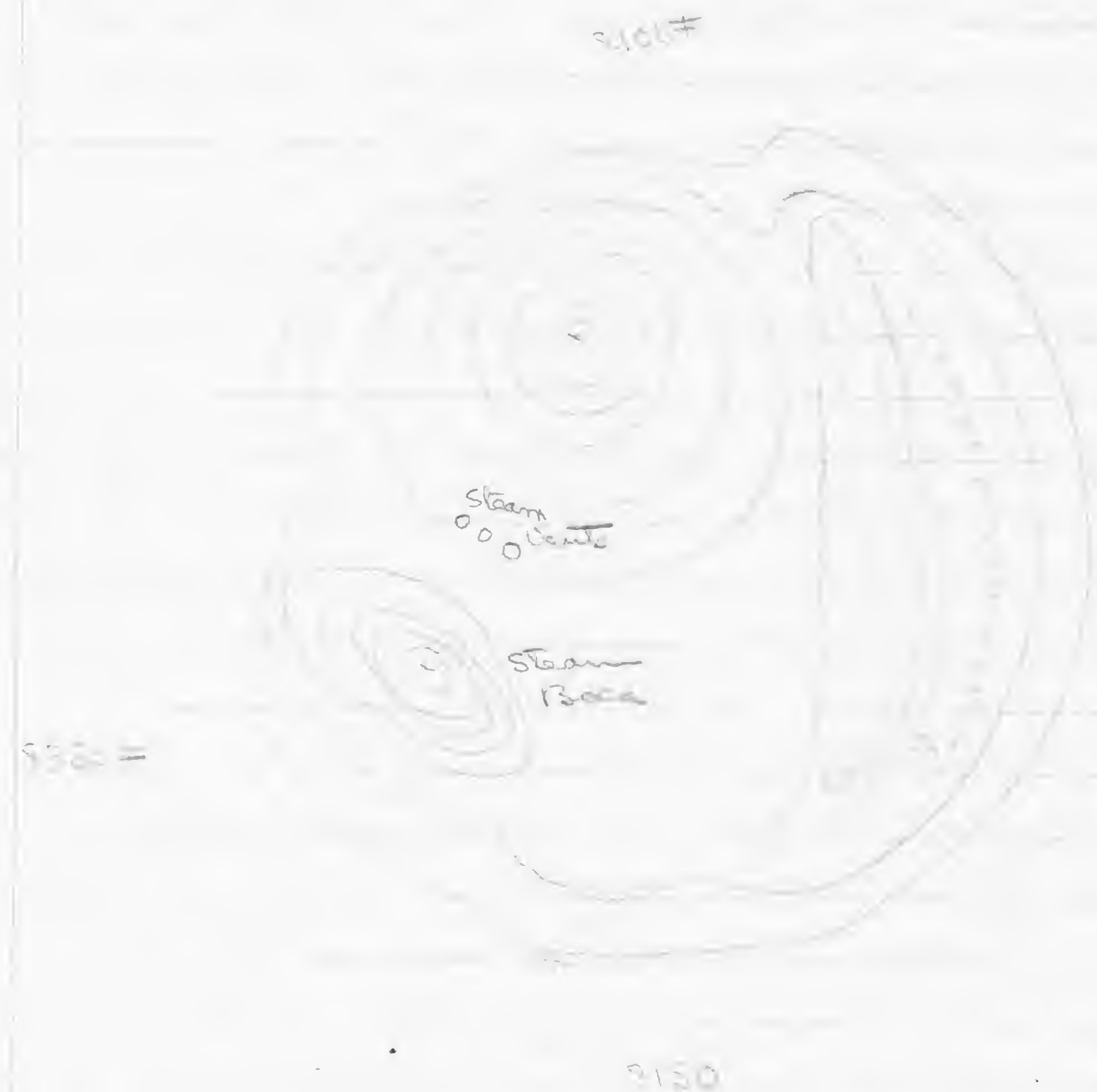
May 29, 1945. Tuesday.

E.C

During the early morning the cone was hidden by fog but the grating roar of the boiler indicated continued activity. About 8 am. the fog cleared and the activity appeared as yesterday with white vapor column but somewhat more erratic, with more frequent and longer intervals of quiet and not so much force in the column. During the morning 2 heavy explosions from the ash vent.

Cloudy.

Left San Juan 2 pm.



July 3, 1945.

Arrived at San Juan, mid afternoon with Weather, Ordóñez, Fries and Abraham.

F.C.

The crater was giving off a heavy column of ash, heavier than I have seen for some time.

Arrived at camp late afternoon.

The crater seemed to have three vents, of which the old north vent was in almost continuous activity, the south vent in sporadic heavy activity and fewer bursts from a new west vent. The north vent carried more ash than in May and was more sporadic. No lightning.

Fair weather during the afternoon. Fog in the evening and rain at night.



July 4, 1945.

E.C.

Went to the Hornitos area

in the morning, passing along the east base of the cone.

The north vent was throwing bombs toward the east, rarely reaching beyond the cone. As we passed the Hornito area, a bomb burst from the west crater rolled bombs down upon us and we had a busy time for a few minutes. The south vent was in very active eruption, casting many bombs to the south, with billowing dark ash. While we were at the lava flow, the west crater gave a huge burst that littered the west base of the cone with bombs.

Bomb types:

Fragment

Irregular spongy.

Triturate cobbles.

Semi-bread crust.

A few small inclusions were noted in some of the bombs.

E.C.

About 2 P.M. the activity from the vents subsided somewhat and by 2:30 P.M. the vents gave off only tenuous gritty dust.

By 4 P.M. activity again increased

and it began to rain. By 6 P.M. the vents were again in high activity, the west vent more than previously, sending sporadic heavy bomb showers at a low angle to the west, sometimes beyond the base of the cone. The north vent rarely showered bombs to the east. The south vent gave off bursts to the south, sometimes with incandescent billowing incandescent ash.

ash.

Thunder

pistol-shot like thunder. Continued like this into the night.

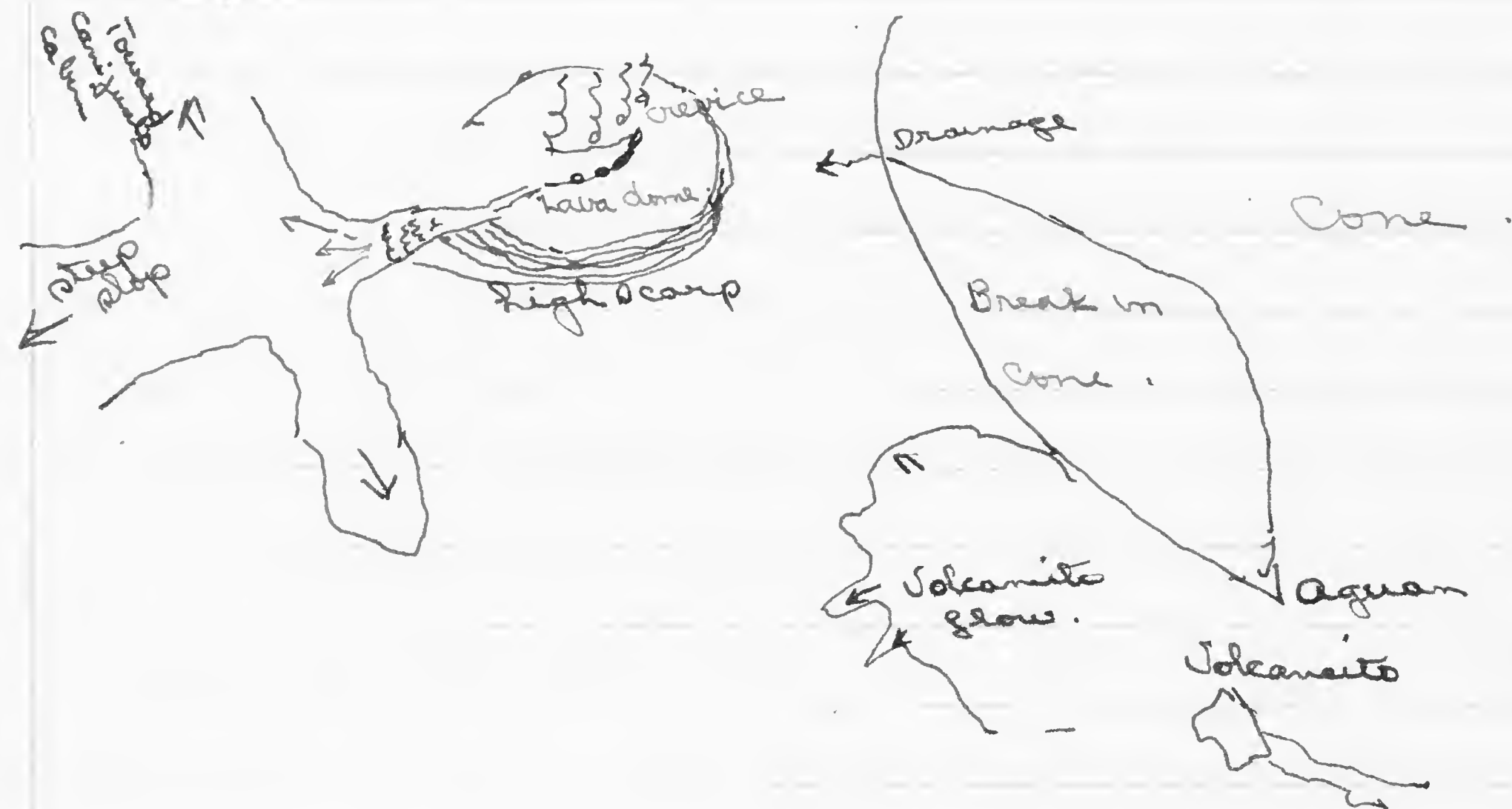
Lava

The lava flow came from a dome-like mass of lava about 100 meters from the base of the cone. It issued from a crevasse in the dome. The upper part of the crevasse cut the dome and showed a number of incandescent vents from which bluish fumes arose. The surface of the dome consisted of lumpy-like smoothish lava. To the south and west this dome terminated in a scarp as if it



had been elevated.

The lava issued as a small flow, about a meter wide but widened rapidly and broke into three tongues. It flowed at a rate of about 1 meter in 15 seconds and gave off gases with a hissing noise.



Again I was impressed by the quantity of lava that comes from what appears to be a very small vent, suggesting that the lava is perhaps rising from a fissure.

One could approach within six feet of the apparent vent and study the movement of the

lava at close hand. The lava did not appear to well up from any point, simply began to flow from a point, almost immediately beginning to fissure. Rocks thrown on the surface of the incandescent flow made no apparent impression and were carried along on the surface of the moving lava. A cobble thrown into a small fissure in the lava was gradually worked or kneaded into the mass.

The Aguan volcanite now shows no flow activity, altho the course of the flow shows gas vents and sublimates. The volcanite is more broken down than before but the conical hornito appears to be intact. Lava flows some several hundred meters to the east. To the south the lava is much recessed, some 5 meters deep. In these crevasses two flows can be distinguished separated by red oxidized ash or by red scuraceous surface. The lava is only moderately vesicular. It is only slightly warm.

A flow, apparently from the volcanite is slowly advancing toward the n. along the west base of the cone. Clutter type

Aguan



Between the flow front and the base of Tanitara, much ash has been washed in by the rains and the lava shows much white steam. In other place, too, the topography is modified by much ash brought down by the rains. Teladonic reports a barranca about 15 meters deep at the foot of Caniguato down which lava from the Hornitos boca flows.

The volcanite is upon a plateau like mass of lava. The north front is steep and crevassed, about 7 meters high, appearing to have been raised up by a sill below. Between this plateau and the cone is the later flow.

Much blue lightning to the north.

No rain, clouding up until 3 PM when slight sprinkling. Heavy wind in morning, a little fog in late afternoon.

July 5, 1945.

E.C. In the early morning, activity like yesterday, diminishing about 10. AM. A few sharp pistol shot cracks of thunder. In the afternoon, heavy column but with little force, so that the heads roll over the rim and down the slope, across the lava to Caniguato and then rising, forming a low drifting chain of heads.

Rain in the afternoon.

Left San Juan about 6: PM.

July 24

8 AM Weak emission of steam from the crater, drifting to the W. Occasional rumble, audible in San Juan.

9 AM. Increased activity with some cauliflower bursts.

Left in the helicopter. Bear pilot, flying over San Juan flow, then around to east and south side of cone. Crater with one throat, apparently the south vent, putting out much ash. Much steam along the east rim



Horitas  
lava

Lava flowing strongly from Horitas base, flowing directly north in three channels, filling the valley between the August ridge and the old lava, cascading down just west of the August fumaroles and has filled the valley between Tratorio and the old Paricutin flow.

Aguan

No evidence of flowing lava from the Aguan flow, its vent marked by a patch of yellow



sublimates.

Few fumaroles any place, appears that most of them are in the black lava.

Description of lava surface.

10:30 Reduced activity, with very small  
EC steam emission, increasing at times to more copious lazy emission

12 PM Lazy cauliflowerers, drifting down  
EC the side of the cone, the ash drifting along the north base of Canigato strong east wind. 10' Kodoehone.

From 12.00 to 4 PM. intermittent weak steam bursts and feeble cauliflowerers.

EC 4 PM to 6:30 White steam bursts with heavy rolling roar (steam vent explosion) with low drifting column of condensing vapor or detached cloudlets drifting to the west. Heavy east wind.

Rain at 6:20.

Large lava flow from Hornito filling in valley between August ridge and Iratiro and the old lava. Fine cascade near its throat and at the lava front of the August ridge, the

latter about 25 meters wide and flowing at a rate of about 1 meter in 10 seconds.

The flow has a broad band of dark rubble in the center with incandescent edges. No odor. Tinkle of moving rocks: One large mass came sliding down the slope, a mass about 3m in diameter, solid.

10 PM. Thin column or lazy puff of pure steam.



July 25, 1945.

E.C. In the morning a thick column with many bomb bursts from the crater.

Continued so all day long showering bombs chiefly to the S.W. but occasionally to the N.E. apparently from 2 throats, the most active one the S. vent.

Went around the cone to the S. side by way of Zapicho to try to get better the lava vent.

At the S. side encountered a lava front, moving very slowly, that appears to have come from the Aguam vent, 8-10 m. high, black lava. The older, ash covered lava in front shows some collapse and fissuring immediately in front of the new flow.

Could not pass to the lava vent because of bombs.

Steam Much steam from vents on the old lava flows, due to rains and high humidity. In some places issues with hissing noise from the ash cover. Very few fumaroles.

Fumaroles The chief fumarole sector is now the N. face of the August ridge where salts are still being deposited. Since some of the ash is washed off by the rains, three incandescent spots are visible at night indicating that the lava is still incandescent within a few feet below.

E.C. During the evening the cone was much obscured by fog, but there was a strong incandescence above the crater that waned and waxed with bursts in the crater. Also a strong incandescence above the lava vent so that more than  $\frac{1}{2}$  the outline of the cone was encircled with a halo of pink incandescence. Faint lightning in the clouds high above the crater, but probably connected with normal storm activity rather than the volcano. Frequent and strong lightning for to the



North and N.E.

Some tremors during the night  
Rain in morning. Rest of  
day and night cloudy and  
foggy.

During the night the activity  
of the crater was largely obscured  
by fog but there was little  
noise, except at times a deep  
sighing or like a distant mill.  
Very few bombs.

Heard a huacamayo, near the  
volcano

July 26.

8:14<sup>30</sup> AM Thick but lazy column from  
crater rising straight up,  
into low overhanging clouds.  
Few bomb bursts.

11:45. Thin tremulous gray column, lasting  
for only a few minutes

12:00 Heavy eruptions with dense  
column and many bombs.

3:20 PM. Heavy rain with some hail  
and thunder

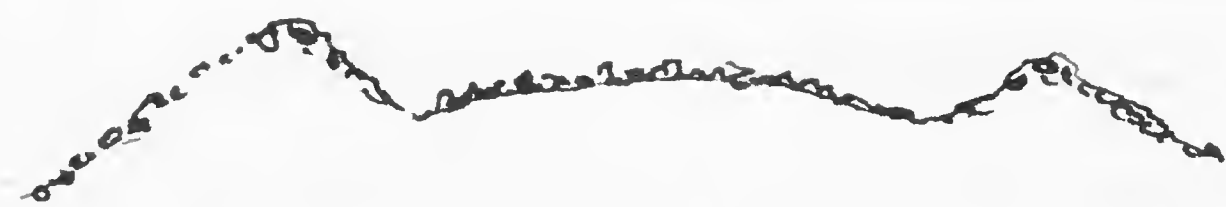
6 PM. All afternoon thick, dense  
column rising straight up  
in majestic column but with  
little noise other than the  
plop of numerous bombs and  
their aggregated purish thru  
the air. Many bombs and  
ash cloud drifting far to  
the west.

7:00 PM. Went to lava cascade, flowing  
a continuous steady stream.  
The flow is bordered by a  
dike of rubble, 3 meters above  
the flowing lava and 3-8 meters  
across the base. The flow  
spreads out funnel-like below  
the cascade. The noise is a  
tinkle of the clinkers that ride  
the moving surface of the lava.



Saw a Humming bird over the lava, and a flock of 6 huakamayos flying high above the volcano.

Heat waves above the lava but no visible condensation of steam and no odor. A few yellow stains are begin to form on the dike.



Cross section of flow near base of cascade.

A huge mass of lava came riding down the cascade, a solid dome like mass, 7 meters long, 3 meters high, ~~like~~ like a ship upon a river.

During the night, heavy billowing column, rising majestically into the overhanging clouds. Numerous bombs up to 9 sec. (1300 feet). lightning One lone lightning flash, diagonally into the column 300 m. above the crater.

Reflections from the lava at the vent and at the cascade very much reduced.

Heavy ash cloud far to the west.

4 PM. Heavy rain with heavy thunder, some hail.

July 28, 1945.

EC. In the morning heavy bursts from the crater, apparently from two or more vents. Large black fingers, with numerous bombs. About mid afternoon much reduced activity with thin languid cloud.

About noon rain, continuing most of the afternoon, with thunder.

Mid afternoon, medium color, dense rising rather languidly into overhanging cloud.

rain water Collected a sample of the rain at the casita. Filtered into clean bottle but it remained rather turbid. Reacted acid to litmus and had a faint taste. Sample collected after about 2 hrs steady rain.

Eruptive column heavy with strong bursts, also heavy condensation cloud above the flow vent, continuing into night.



July 29, 1945.

Fairly clear in morning. Heavy eruptive column in morning and early afternoon.

Mid afternoon, variable with weak column varying to lazy steam column.

Keller, who flew over in the helicopter, reports a small new vent in the crater, about a meter across, from which came a steam jet. He could see no terraces.



Rain during later afternoon.

During night, clear sky, except for ash cloud and a few wisps of cloud.

Lightning Much lightning in the lower part of the eruptive and a few faint blishes in the summit of the column. Vivid lightning far to the S.E. Lightning vertical, inclined or horizontal. Several small sheet-like spots, that just reports from

his electroscope reading, has opposite sign from the other lightning.

Photos (1) (# 1) single large flash.  
(2) 4 flashes 10 min  
(3) sheet flashes 15.  
4 20 min.

Fairly good bursts, medium eruptive column. No apparent connection between bursts and lightning

July 30, 1945.

8:00 Fog over crater

9:00. Fairly thick column, rising languidly and drifting west over lip. Very little force, occasionally weak cauliflower and occasional small finger burst

July 31, 1945

8-12 Am. Heavy eruptive column all morning with black bursts from south crater. Helicopter flight

Active explosions from south throat. A small vent, about  $\frac{1}{2}$  m. across yielding a small intermittent column of dirty steam. The crater shows a bench, broader to the N.E., narrow to the southwest.



12-5 Pm. Cone obscured by rain and fog.

5 Pm. Very heavy column, dark in color night: early evening fine bomb bursts with small vapor column.



Aug. 1, 1945.

Morning. Lazy column with weak cauliflower bursts drifting low over crater rim to west.

Clear & sunny in morning  
Left San Juan 12: PM

During this period activity characterized by dense smoke column, fairly numerous bombs and general strong activity, steady lava flow from Hornito vent. see photos for shape of crater. Usually one single vent, south vent, with minor and intermittent steam emission from a small throat without crater near north vent.

Aug. 6, 1945.

Left Huapam 11:30 with Enrique Cantero and Genaro Gonzalez.

Stopped at the mouth of the Norte arroyo and saw little change from previous visit about a year ago, except the accumulation of washed in ash, extending for almost a kilometer along the lava front and about a  $\frac{1}{2}$  kilometer wide, with estimated depth of about six meters. Saw but two fumaroles on the whole lava field yielding bluish fumes, but a number of steam fumaroles, most of which seemed concentrated along the old arroyo course, yielding copious white steam. The steam vents along the immediate lava front facing Norte, indicating that this lava is cold. Little accumulation of water in ponds, indicating that the lava dam is very porous. Abundant log platinum along the lava front.

From the crater since a caper cloud condensing about 250 m. above the crater, merging with low overhanging clouds, the condensing vapor having



frequently two tails or two bulges, like pants legs, one from the crater, one from the lava vent. The noise from the crater is a rumbling roar, indicating a strong steam vent. Rare and small single ash bursts that rise high.

Roar of lava still very distinct but reported by Celadonio to be diminishing. The lava front between outlet and the older lava is spreading and beginning to overtake the older lava.

at times the cone seems clear but long rumbling roars suggest continued steam jet activity.

The condensation of the steam above the hot throat forms tatters of steam, increasing in volume higher up to form tongues of steam, a dirty pale brown by transmitted light forming two cones projecting down from a low overhang of clouds.



Condensing vapors  
4 PM. Aug 6. 1945



6:30 PM. Aug 6. 1945



Walked over the fields to observe  
 erosion. Many shallow step-walled  
 gullies, frequently exposing original  
 soil, upon which are sprouting  
 small seedlings, apparently a  
 grass. The depth of the ash  
 seems much reduced. Erosion  
 in the deeper, original canyons  
 shows removal of all ash and  
 considerable stunting of old  
 material. Some transport of  
 cobbles and small boulders out  
 on ash by action of sheet  
 floods.

Pine seedlings in ash in  
 pine woods near Route. Beans  
 near ash seem to be doing  
 well. Nicotiana and Chiricote  
 thriving thru the ash.

Mauricio Duarte, Orio de Rosales,  
 formerly San Juan states, that  
 on Sunday Feb. 21, 1943 the cone  
 was about 25 meters high at  
 10 A.M. and the column rose higher  
 than Tamitars

Oct. 27, 1945.

Letter from John M. Barb.

"The night was exceptionally clear and the volcano was exceptionally active. It appeared to expend its power in a series of bursts of progressively longer duration with longer & longer intervals between. The average length between eruptions. The guides told us that it was more active than it had been for some time. The three days previously, evidently the night of the 23<sup>rd</sup>, the new flow of lava had covered the bottom of the mountain and did not flow until it reached the bottom of the valley.

The outbreak was preceded by an unusually outstanding cannonade which lasted longer and threw stones heavier than any we had seen. This eruption lasted for some time twenty minutes and at its height we saw lava begin to flow from an opening about half way up the North-west side. There was what appeared to be smoke and a considerable amount of light, were emitted. During this



eruption we noticed that it required 9 seconds for one of the rocks to fall from its zenith to the crater; although there were others thrown higher we neglected to time them.

The explosions then began to diminish in intensity, the noise diminished, the amount of rocks thrown out decreased and the length of time between eruptions increased. These things occurred gradually, however. The flow from the new opening continued unabated at least until after we returned to Muşayan at 3:30 PM.

John M. Barb.

## Bridge's Movies

Nov. 14, 1949

Pure white steam column, with short sharp explosive puff, column rather weak, not rising high.

Can use few sequence, white eruptive column from base of cone no. 29. and shot of cone no. 19, with dead timber.

Cloud's pictures. not much use.





++

1

1

1

1

1

1

1

## Fishhawk Bunnies

1. Oak full of Anguian.
2. Another
3. San Juan Church in lava, with Antonio Gutierrez.
4. Ruins of San Juan from Church.
5. Ruins of San Juan and the lava front from the S. end of the plaza, with Antonio Gutierrez.
6. San Juan lava looking toward the volcano.
7. Destruction of San Juan.
8. Ruins of San Juan.
9. " " " "
10. Destruction of San Juan.
11. Church of San Juan with volcano in background.
12. Looking down street of S. J. with lava, volcano in background.
13. View of volcano from S. J. street, with white eruptive column and cumulus head.
14. Site of San Juan: kids riding pig.
15. " " " " kids riding pig on the church.
16. Site of San Juan: kids playing marbles.
17. View of eruptive column from Polzcuaro - Ochoa road.
18. Sunset view of column down a

## Sheet in Photo.

19. Sunset view from Cocoran - May 1944
20. Another
21. Another looking into falling ash.
22. Crater from Cocoran
23. Sunset from Cocoran looking west.
24. Eruptive column at dusk.
25. Easy eruptive column
26. Low building column, July 1945.
27. Cone & white eruptive column - Helicopter in foreground.
28. Lava river, July 3, 1945. The hole down from which the river issued with incandescent clinks and fumes.
29. Another, better weather
30. The Photo
31. Sunset from the crater July 3, 1945
32. Low building column from the S. J. street, July 3, 1945. Sun low as 22-30 feet above horizon.
33. Sunset view looking toward horizon.
34. Another
35. Helicopter at cone.
36. Destruction of San Juan from Polzcuaro.
37. The cone from the old lava road, looking toward the lava river.



- 39 Another  
 39 Lancers on road, near Zibucano.  
 40 Can. over near Mochua.  
 41 Another  
 42 ?  
 43 Lava advancing thru woods.  
 This is the San Juan flow.  
 44 Sampling a hornito for gases.  
 45 Another  
 46 A volcanito  
 47 Volcanitos  
 48 The hornitos fields (2)  
 49 " " " "  
 50 Lava flow, July 3, 1945 (3).  
 51 The "Cave" in eruption with the "Sopela"  
 52 Ordones near the "Cave"  
 53 Fuming hornitos  
 54 " "  
 55 " "  
 56 The "Blister" (2)  
 57 Ordones at the "Blister".  
 58 A volcanito in eruption  
 59 A good Cauliflower column.  
 60 Chuchi at a fumarole. ~~54 July 1945~~  
 61 Fumaroles in Zapicho lava  
 62 A fumarole in the Zapicho flow  
 63 Chuchi at iron chloride fumarole on Zapicho flow

- 64 A lava front  
 65 A note shot of the cone.  
 67 Collecting minerals on an old hornito near Aguas Nov 1944.  
 68 A dissected hornito to show distribution of minerals.  
 69 Fumes at the Aguas volcanito.  
 70 Another  
 71 The Aguas volcanito  
 72 Chuchi at a fumarole.  
 73 Perez Pena with gas collecting train.  
 74 Fumaroles near 73.  
 75 A hornito. A gas sample was taken from this one.  
 76 Celadonio at a hornito  
 77 Boys who ascended cone.  
 78 Boys ascending cone.  
 79 Big Remolino.

Crater Sequence: 85'

Volcano with column

Part of the crater

Draught Column 2

White Column 4th.

" " 4th.

White Column 2 towers 4th

Fires, Rain, Caladonia on sum

White Column 4th

Incandescent bluffs

12'

11

3.

5.

11

11

11

10.

7 1/2

2

Fisher's Film

Reel # 1.

Introductory

1. Smoke column from W. ridge
2. " " " G. B. Rd., including pan up of column & view from road to summit
3. Smoke column from W. ridge

March

4. Fisher's early view of
5. " " " " "

Apr. 6. Fisher's photo on April 6.

7. O.F. view of

8. O.F. clearing road in S.E.

9. O.F. view of house at camp on

10. O.F. Fisher's early view of

11. O.F. Fisher's early view of

12. U.F. Fisher's early view of

13. U.F. Fisher's early view of

14. U.F. Fisher's early view of

15. U.F. Fisher's early view of

16. U.F. Fisher's early view of

17. U.F. Fisher's early view of

18. U.F. Fisher's early view of

19. U.F. Fisher's early view of

20. U.F. Fisher's early view of

21. U.F. Fisher's early view of

22. U.F. Fisher's early view of

23. U.F. Fisher's early view of

24. U.F. Fisher's early view of

25. U.F. Fisher's early view of



19.	Side view of eruptive column Hard cauliflower on eruptive column	5 5 25 1/2	1/3 1
20	Panucuter, hill with cones and Luis among the dust	8	1/4
21	C.F. Remains of summit	9	1/4
22	Base of Remains	15 1/2	
23	C.F. Remains of summit Wind effects	6 1/2 39	1
24	Top of cone & side of eruptive column, with bombs	12	
25	Bombs striking side of cone	4	
26	F.P. Cone with many bombs	5	
27	F.P. Bomb with broken bomb	4	
28	F.P. Compare of Bomb on Toluca road	5	
29	F.P. Bomb on road at Toluca rd.	5	
	Bomb	33	1
30	F.P. Falling & back of Fumeroles	11	
31	Another	11	
32	Another	6	
33	F.P. Falling, Luis & Felipe watching into stream	18	
		56	1 2/3
	End of Roll #1 3-2 out 12-15 min.		

## Roll #2

1.	F.P. Fough measuring T.	2 1/2	
2	F.P. Thermocouple apparatus	1 1/2	
3	A Bal ammonia fumeroles	12	
4	F.P. Using a high T thermometer	10	
5	A Bal ammonia c. fumeroles, F.P. Acro ping off path	8	
6	Pough removing condensing tube	6	
7	F.P. at fumeroles	4	
	Fumeroles.	45	1 1/2
F.P. 8	Twilight, June 9 eruptive burst	28	1
9	Test morning, cone blew out.	8	
10	Tolucan with gullwing hills	23	
11	June 10th. Lava flow (1943)	52	
12	Lava flow, ash slopes & dead trees	6	
13	Luis below large block. - Old ash covered lava below, fresh above	10	
14	The huge block falls.	6	
15	Small patches of dripping lava.	8	
16	Pough with optical pyrometer <del>observing lava dripping.</del>	10	
17	Observed lava	27	
18	End of Events of June 9-10	178	54
18	OOF at Zapichu	8	
19	Luis & Chuchi at Zapichu	9	
20	Close up of Zapichu	10 1/2	
21	Zapichu throat at night	11 1/2	
22	Same Zapichu	18	
23	Zapichu bomb from the road	11	
	Zapichu	27 1/2	
24	Taqui	52	2 1/2



	Hornets		
	" with fully matured	12	
	Tape	64+	3
	End of Rail #2		
	360 set		
	12-15 runs.		
	Rail #3.		
WFF 1	Hornets running	7.	
WFF 2	" "	3.	
WFF 3	" "	3.	
4	Fighting hornets	2	
5	Fighting hornets	12.	
6	Hornets with fish, including running with comets	15	
7	Thunderbolt running	5	
8	Taken to Island 1	11	
	Hornets + Hornets	58	2
9	The Chance, with horn	7	
10	The Chance, with horn	10	
11	The Chance - 1 night	5	
12	Another	14 1/2	3 1/2
13	Chance showing Day.	5	
14	" " " " " "	5 1/2	
15	" " " " " "	7 1/2	
16	" " " " " "	15.	
17	" " " " " "	19	
18	" " " " " "	8	
19	Poughs fountain	80	3

	Visitation, Chance, Four sails	176	6 1/2
WFF 20	Sail advancing from the wind	5	1/2
WFF 21	Under	5	
	Sail advancing by S.J.	10	1/2
22	Come from San Juan July 17th		
	Starts at destination.	5 1/2	
23	Came from San Juan July 17th		
	advancing into town, horns blowing	3	
24	Sail coming down from S.J.	33	
25	Under and then at the point	8	
26	Under lighting signals	7	
27	Tanaricus at base	5	
28	Keep with currents in S.J.	2.	
29	Gladius at burning base	5	
30	Women carrying plank, etc.	26	
31	Sunset.	11	
	Disturbance of San Juan.	118	5 1/2

End of Rail #3

360 set

15-17 runs.









Remains of S. J.  
 Traversing lava flow  
 out, Aubrey et al

S. J. of people with boulders  
 common lava.  
 Boulders mostly 12000  
 Aubrey at lava front note  
 rubble front.  
 Pale gray smoke column  
 S. J. lava at S. J.  
 More boulders ahead  
 especially Aguan lava flow  
 Go to leaving from  
 Church tower  
 Altar  
 S. J. ruins.

23

Carrara

Uruguay

Racetrack

Old Lava Terraces

Conejos

The Carrara

Air heater note Zapichu

Lava river

Old Lava Flow

Williams' Yards & Hotel  
Old crater in background  
50 ft Lava river

Note at end of lava

Note chka

Zapichu

Viscous Lava, 7-11000'

Crack looking off note

Crack looking off

Crack & Zapichu  
Note at end of Zapichu

Zapichu at dusk

Zapichu at night

Tague the volcano note

note the craters

Tague note steam above

and the lava flow

note slushy of lava, about

1150'

The Hornito & volcanic  
Choking flames

Hornito area, yellow ash



#2

Pony taking T. near.

Fumarole with NH<sub>4</sub>Cl.

Small fumarole with steam.

NH<sub>4</sub>Cl crust.

Collecting sub in lake

Cone at night on

June 9 small column

Pond at night

Cone with day

Towers moving. Note

Geo

Moving towers.

Large steam. Big melting

boulders.

Dust - not clear

steaming ground.

Extent of lava, dead trees  
and ash covered surface

Ash covered flow hill

later advancing flow

Pony measurement T.

with optical Pyrometer





